STATE AND PRIVATE FORESTRY
Insect and Disease Control
U.S. Forest Service

1974

by

Jerry A. E. Knopf

BIOLOGICAL EVALUATION
PINE BUTTERFLY, BOISE ZONE, R-4
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INTRODUCTION

Periodically populations of pine butterfly (Neophasia menapia F.&F.) cause severe defoliation of ponderosa pine stands. Past outbreaks have covered large areas. Tree killing has resulted directly from foliage loss followed by further depredation from bark beetles as they invade the weakened stands.

Defoliation of pine stands along the south side of the Salmon River became obvious during aerial surveys in 1971. This infestation on the Payette National Forest followed one year after noticeable defoliation of pines occurred on the north side of the river, Nezperce National Forest, Region 1.

Upsurge of pine butterfly populations in Montana and Idaho caused entomologists and land managers concern since this insect is a known tree killer. Presence of the butterfly generated field testing of Zectran and Bacillus thuringiensis in 1973. Mortality rates from both materials exceeded 90 percent and it was felt that control of populations could be effected if the epidemic persisted. Natural factors were apparently responsible in both Regions 1 and 4 for reducing populations and no wide-scale heavy defoliation occurred in 1973. However, lowered populations persisted and many areas experienced light to moderate needle loss.

Late in the field season an area of moderate to heavy defoliation was detected from the ground near Harris Creek Summit, Boise National Forest. Egg mass surveys indicate light to moderate defoliation in 1974.

General Information

Causal Agent - Pine butterfly, Neophasia menapia (F.&F.)

Host - Ponderosa pine.

Location - Salmon River Breaks, Payette National Forest and adjacent Bureau of Land Management, State and private lands; Harris Creek Summit, Boise National Forest.

Type of Damage - Defoliation - destruction of old needles and loss of new growth when larval feeding becomes heavy; tree mortality and loss of radial growth.

At low population levels only the old foliage is consumed. Under epidemic conditions both old and new foliage is eaten. One year of complete defoliation will cause tree mortality. Even if stands survive partial defoliation, radial growth loss will occur and trees become more susceptible to killing by bark beetles because of their weakened condition.

Aerial detection surveys in 1972 and 1973 showed an increase in defoliation area from 4,400 acres to 8,000 acres. Approximately the same number of acres in the same areas were heavily defoliated both years. To date no buildups of bark beetles have been detected in affected stands.

Biological Information

The adult is a white butterfly with black markings and a wing expanse of about 1 3/4 inches. The wings of the male are white except for some black markings on the tips. Forewings of the female have similar black markings, but have a distinct yellowish cast; the hind wings have the same yellowish cast but have a much heavier black marking than in the male.

Flight of the pine butterflies occurs in August, September, and October. Emerald-green eggs are laid on needles a few hours after mating. The winter is passed in the egg stage, hatch the following June, or about the time the new needles begin to appear on ponderosa pine. Larvae, as they hatch, are very small, pale-green caterpillars, with shiny black heads. They feed in clusters, encircling the needle with their heads pointed toward the tip. Later on they feed singly; the larvae reach full growth by the latter part of July. When mature they are approximately 1 inch long, dark green, with two white lateral stripes down each side. Full-grown larvae lower themselves to the ground by silken threads and then ascend low-growing vegetation to transform to pupae, forming chrysalids attached to shrubs, grasses, limbs, and tree trunks. From 15 to 20 days are spent in the pupal stage, and then the insects emerge as mature butterflies. There is one generation a year.

Sampling Procedures and Results

Seventeen permanently established collection points were visited in the fall of 1973 to gather egg mass data. At each collection point a sample unit was taken. A sample unit consisted of six (6), 5-inch twigs pruned at midcrown from each of 10 trees for a total of 60 twigs. Sample trees were located close together at each collection point and selection of the twigs was at random. A comparison of 1972-1973 data is shown in Table 1.

Table 1. Extent of Infestation - Pine Butterfly - Boise Zone*

1972			1973		
Moderate	Heavy	Total	Moderate	Heavy	Total
1,960	2,440	4,400	5,800	2,200	8,000

*No acreage figures available for Boise National Forest.

In addition to egg mass sampling, 453 pine butterfly pupae were collected in the Fall Creek area to determine parasitism rates. From these pupae 415 parasites emerged, which gave a parasitism rate of 92 percent. This was one of the first damage areas detected on the Payette Forest and it had suffered heavy defoliation in 1972 and 1973.

Table 2. Infestation Trend - Pine Butterfly, Payette National Forest

	No. Viable Eggs 5" Branch Tip		Expected Defoliation
	1972	1973	1974
Krassel Airstrip	0.18	0	0
Lake Creek	0.45	0	0
K Creek	2.45	0.10	0
Bear Basin	1.10	0.25	0
Fall Creek Ridge	49.70	2.63	0
Fall Creek Cabin		0.72	0
Studebaker Saddle	25.45	2.95	0
Riggins Hot Springs	0.48	0	0
Denny Creek	6.67	0	0
Camp Creek	0.22	0	0
Railroad Saddle	0.27	0	0
Split Creek	4.82	0	0
French Creek		0	0
Sister Creek		0.4	0
Cow Creek		0.1	0
Browns Pond		0.4	0
Mud Creek		0	0

Boise National Forest

No visible defoliation of ponderosa pine was detected from the air on the Boise National Forest in 1973. However, a small area of heavily defoliated trees, covering about 20 acres, was detected from the ground near Harris Creek Summit. Extremely high numbers of adult butterflies were noted ovipositing on ponderosa pine.

One sample of 10 trees consisting of 60, 5-inch twigs showed 17.6 eggs per 5-inch branch sample. This figure indicates the population will increase in 1974 and defoliation is expected to be light to moderate.

Discussion

Pine butterfly infestations on the Payette National Forest took a decided upward trend in 1971, followed by high egg counts which were recorded from Warm Springs Creek to Studebaker Saddle. Visible defoliation varying from light to heavy occurred in 1972. Egg mass samples in 1972 showed several areas where defoliation was expected to continue through 1973. The infestation increased in size during 1973; however, areas of heavy defoliation stayed the same. Apparently natural controls such as parasites and predators have caught up with pine butterfly populations and have caused a "leveling off" of activity for the time being. Fall, 1973, egg mass counts show a decided reduction compared to 1972 counts. This reduction plus heavy parasitism indicates that 1974 defoliation levels should drop off markedly, with the exception of the Boise National Forest.

Recommendations

In view of low egg mass counts plus heavy parasitism rates, no control is recommended for 1974.

Prepared by: J. A. E. Knopf (AC)

JERRY A. E. KNOPF, Entomologist
Insect and Disease Control

Approved by: A. M. Rivas

ALFRED M. RIVAS, Director
Insect and Disease Control